Nevada Comprehensive Profile For Stroke Prevention 2011

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Nevada Comprehensive Profile on Stroke Prevention

Executive Summary

Stroke is the third leading cause of death, a major cause of disability, and an ongoing healthcare expenditure in the United States. Each year about 800,000 Americans experience a new or recurrent stroke. Someone in the United States has a stroke every 40 seconds; and every three to four minutes, someone dies of stroke. It is by far the most frequent, most prevalent, most deadly, and most costly of all serious neurological emergencies.

Stroke is a major healthcare concern and a serious public health problem. It is caused by an abrupt interruption in the blood vessels supplying the brain, resulting in a rapid loss of brain function. Disabled stroke patients continue to suffer not only from physical and functional impairment, but also from severe emotional consequences and a heavy economic toll that continues to overburden patients, their families and the community as a whole.

Many strokes can be prevented, and most of the complications of the disease can be avoided. Currently, there are several interventions proven to be very effective in preventing this disease or reducing its incidence. Prompt healthcare interventions coupled with appropriate and timely treatment can significantly reduce morbidity, mortality, disability, and the ongoing medical expenditure associated with this disease.

Risk Factors for Developing a Stroke

1. **Medical Conditions**
   - High blood pressure (hypertension)
   - High blood cholesterol
   - Heart disease and common cardiovascular disorders such as coronary artery disease (CAD) and atrial fibrillation
   - Poorly controlled diabetes mellitus
   - Previous history of a stroke or a transient ischemic attack (TIA)
   - Blood disorders such as sickle cell anemia
2. **Unhealthy Behavior/Lifestyle Tobacco Use**
   - Alcohol use
   - Lack of physical activity
   - Unhealthy nutrition
3. **Genetic predisposition**

Aging is the single most important risk factor for developing a stroke and other chronic diseases or conditions. However, by no means should stroke be considered an inevitable or a natural consequence of aging. There are several behavioral risk factors that can be acted on and modified to reduce an individual's risk for developing a stroke. Primary prevention such as a healthy diet and adopting an active lifestyle is not only beneficial for reducing the risk of stroke,

but can also help improve overall health outcomes and prevent other illnesses such as heart disease and cancer. For example, people with hypertension should lower their blood pressure and individuals with diabetes should control their blood sugar levels to reduce the risk of having a stroke. All people should refrain from smoking and excessive drinking.

After heart disease, cancer, chronic lower respiratory disease, and unintentional injuries, stroke ranks as the fifth leading cause of death in Nevada. Tens of thousands of Nevadans are currently disabled due to stroke, each year an additional ten thousand are newly diagnosed, and over nine hundred die from this disease.

The most recent data and information from several state and national sources was collected, compiled, analyzed and represented for this profile from the following sources:

- Nevada State Health Division
    - Behavioral Risk Factors Surveillance Survey (BRFSS)
    - Vital records
    - Hospital discharge
    - 2008 Interim Population Estimates of Nevada's population
- Centers for Disease Control and Prevention
- Joint Commission on Accreditation of Healthcare Organizations (JCAHO)
- The U.S. Census Bureau

According to the most recent Nevada BRFSS data, the prevalence of stroke increases with age: about 20,000 Nevada seniors age 65 and older are currently living with the devastating consequences of stroke. The prevalence of stroke among women (2.78%) is significantly higher than among men (2.07%). In large part this observation is due to the longer life expectancy for women in Nevada and nationwide. There are substantial differences in the prevalence of stroke among the racial/ethnic groups in Nevada. The overall prevalence of stroke is highest among African Americans (4.7%), compared to 0.77% among Hispanics and 2.63% among Caucasians who reported having had a stroke. These rates are consistent with and comparable to nationally observed figures. For all racial/ethnic groups, lower stroke prevalence rates are observed among those with higher education attainment.

In accordance with stroke risk factors, more than 39% of all surveyed Nevada residents reported having high blood cholesterol, and 27.5% reported having high blood pressure. Furthermore, 41.89% of the surveyed African Americans in Nevada reported having high cholesterol and 34.44% reported having high blood pressure. More than a half (54.02%) of the surveyed senior citizens age 65 years and older reported having high cholesterol, and about 58.89% reported having high blood pressure.

Similar to the rest of the nation, men in Nevada are at higher risk of developing a stroke and dying from it at a younger age than females. More than 65% of those hospitalized with stroke in Nevada are older than 65, and about 10.2% of all hospitalized stroke cases are individuals of African American origin. Higher rates of stroke risk factors such as hypertension and diabetes observed among African Americans probably contribute to this observation.

Almost all mortality due to stroke in Nevada occurs among individuals older than 35 years of age; about 80% of strokes occur among persons aged 65 and older. As of a few years ago, stroke mortality began declining, probably due to effective modern therapy, a case-managed team approach, rapid response and transportation to a Primary Stroke Center (PSC) for prompt healthcare management. Similar to the rest of the nation, in 2005 Nevada met and exceeded the Healthy People 2010 Target Mortality Rate of 50/100,000. The age-adjusted mortality rate in Nevada due to stroke in 2008 was 40.2/100,000. The new Healthy People National Target Rate for the 2020 is now set at 33/100.000 U.S. Standard Population.

Nationwide, healthcare costs related to stroke exceeded $62.7 billion in 2007 and reached about $73.7 billion in 2010. According to the Centers for Disease Control and Prevention (CDC), the mean lifetime cost resulting from an ischemic stroke is estimated to be more than $140,000 per patient. This heavy financial burden is expected to continue and increase with the aging baby-boomers, increasing life-expectancy, and the sustainable growth in the number of senior citizens observed in Nevada and nationwide. Between 2005 and 2009, the healthcare expenditure due to stroke in Nevada continued to increase for all clinical types of stroke exceeding $725,238,000 in 2009. Ninety percent of stroke hospitalization cost in Nevada was covered by four major pay sources. Medicare covered about 50%, healthcare management organizations (HMO) paid about 24%, preferred provider organizations (PPO) negotiated rate supported about 12%, and Nevada Medicaid covered about 5% of all stoke-related healthcare costs.

Nevada hospital discharge data shows that in the past four years, most stroke patients sought treatment in about forty-two medical facilities around the state. However, relatively few facilities have the critical elements required for stroke care. Slightly more than a half of all acute stroke patients in the state received their treatment at a primary stroke center (PSC). Only nine hospitals - one in Reno and eight in the Las Vegas area - are currently accredited by the Joint Commission as PSCs.

Advances in the treatment of stroke led to the development of PSCs, hospitals where teams of medical professionals who specialize in stroke management work together to early diagnose, treat, and provide rehabilitation and ongoing care to stroke patients.

Nevada would benefit from a more integrated system of stroke-specific care to improve services across the continuum of stroke prevention, treatment, and case management. Together with a group of experts, the Nevada State Health Division is mapping a standardized path and best practice protocols for improving the process of stroke care in Nevada. Specific goals of the Nevada Integrated System of Stroke Prevention (ISSP) are:

- Identifying all patients in Nevada emergency departments who present with possible acute stroke.
- Promoting and supporting quality improvement activities, interventions, and systems-level changes.
- Systematically collecting and analyzing data to assess process and outcome of interventions.

The Nevada Comprehensive Profile on Stroke Prevention includes a population-based plan for prevention, early detection, and case management of stroke in Nevada. This plan, the Integrated System of Stroke Prevention (ISSP) addresses community development, mobilization, and partnerships with healthcare providers, community-based organizations, and state stakeholders to increase awareness regarding early identification, rapid transportation and proper management. It also promotes the coordination of a system where individuals who experience a stroke can have rapid access to an appropriate and timely coordinated healthcare plan (CHP) at a PSC providing maximum potential to achieve most favorable outcomes. Measures that improve recognition and rapid identification of early signs of stroke and timely access to a PSC can minimize the impact of stroke and reduce its heavy burden on individuals, families, and the community as a whole.

As an extremely rapid response medical emergency, early identification of stroke symptoms, prompt care by emergency management services (EMS), and rapid transportation to appropriate hospitals or a PSC is crucial to reduce morbidity, mortality, disability, and healthcare costs. Timely and appropriate treatment is proven to increase survival and ensure higher potentials for functional recovery. Prompt hospital-based diagnosis, specialized treatment, follow-up, and disease management are essential to reduce severe complications and improve the outcome of this disease. For each minute that passes after a stroke, an estimated two million brain cells die, and every second of delay diminishes the stroke sufferer's chance to return to normal functional life.

Best practices in stroke emergency management include immediate transportation to a PSC and the rapid administration of *tissue Plasminogen Activator* (t-PA) to break up blood clots in the case of *ischemic stroke*. Research shows that thrombolytic treatment, the use of clot-dissolving drugs, can improve recovery, and therapeutic effects are optimal when such treatment is given as soon as possible after the onset of a stroke. National studies show that relatively few people with an acute stroke received t-PA, a medication that when given within three hours after the first stroke symptoms can help dissolve stroke-causing blood clots. Medical and surgical treatment is usually needed to stop bleeding in the case of *hemorrhagic stroke.* Stroke patients are at higher risk of suffering a subsequent stroke. At least one in every eight stroke survivors will develop another stroke within five years.

The Nevada Comprehensive Profile on Stroke Prevention is intended for use by public health professionals, policy makers, health planners, healthcare providers, the public and the media. It includes sections on stroke risk factors and ways to prevent this disease, physiopathology, common signs and symptoms, and treatment for the different types of stroke. Additionally, it presents a thorough data analysis describing the extent of this disease (prevalence, incidence, hospitalization, and mortality trends), and a brief description of the societal, medical, and financial impact of stroke in Nevada and nationally.

The Nevada Comprehensive Profile on Stroke Prevention includes a statewide plan to create, promote, and coordinate an ISSP in which it will be possible for Nevada residents and visitors who experience a stroke to have rapid access to an appropriate and timely CHP at a PSC in order to attain optimal outcomes.

We must reverse the alarming morbidity, mortality, and disability trends of this very prevalent and deadly disease. The implementation of the Nevada Comprehensive Profile on Stroke Prevention will significantly benefit potential stroke patients by promoting instantaneous access to appropriate and timely diagnosis and treatment. Patients will also benefit from more state-of-the-art healthcare at specialized PSCs. Further, by implementing the ISSP, Nevada will meet and exceed the Healthy People 2020 National Target Rates and will improve the quality of life for all stroke patients and their families.

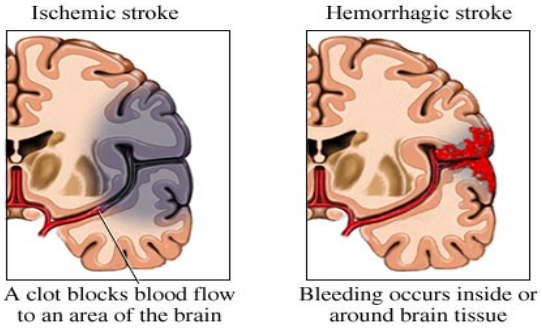
Introduction

Stroke is the third leading cause of death, a major cause of morbidity and disability, and an ongoing high healthcare cost in the U.S. After heart disease, cancer, chronic lower respiratory disease, and unintentional injuries, stroke ranks as the fifth leading cause of death in Nevada. Each year approximately ten thousand Nevadans are newly diagnosed with a stroke and at least nine hundred individuals lose their lives to this preventable disease.

Aging is the most significant risk factor for stroke, and as is the case with several other cardiovascular diseases, the risk of developing a stroke and dying from it increases with age. However, stroke should not be considered an inevitable consequence of aging. There are numerous interventions that individuals and communities can implement to successfully reduce the risk and burden of this prevalent disease.

Stroke occurs when a blood vessel supplying the brain is blocked or bursts, as illustrated in figure 1, resulting in a rapid loss of brain functions. Ischemic stroke, more common than hemorrhagic stroke, occurs abruptly when a blood vessel in the brain is blocked, depriving some brain tissue from its extremely needed blood supply. Without blood and the oxygen it carries, parts of the brain start to die and corresponding parts of the body controlled by the damaged brain area may fail to function properly. Lack of adequate blood supply can damage the brain tissue within minutes, hence the importance of knowing stroke symptoms and acting rapidly. For each minute that passes after a stroke, an estimated two million brain cells die, and every second of delay diminishes the stroke sufferer's chance of returning to their normal life.

Figure 1. Pathology of Stroke



Risk Factors

Disease determinants and risk factors for stroke are multiple. In addition to aging, they may include underlying medical conditions, unhealthy behaviors or lifestyle, and genetic predisposition.

1. Medical Conditions:

    - High blood pressure (hypertension)
    - High blood cholesterol
    - Heart disease and other common cardiovascular disorders such as coronary artery disease (CAD) and atrial fibrillation
    - Diabetes mellitus
    - Previous history of a stroke or a transient ischemic attack (TIA)
    - Blood disorders such as sickle cell anemia

2. Unhealthy Behavior/Lifestyle:

    - Tobacco use
    - Alcohol abuse
    - Lack of physical activity
    - Poor nutrition

3. Genetic predisposition includes:

    - Family history of cardiovascular disease, hypertension and/or stroke
    - Gender. Men are at greater risk than women to develop a stroke at younger age. However, because life expectancy for females is higher, more females than males develop stroke at advanced age
    - Race/ethnicity. African Americans, Hispanics, and American Indian/Alaska Natives have a greater chance of developing a stroke at younger age than do non-Hispanics, Asians or Caucasians.

Signs and Symptoms of a Stroke

Stroke is an abrupt serious event that can affect any neurological function. The five most common (sudden) signs and symptoms of stroke are:

- Sudden numbness or weakness of the face, arm, or leg
- Sudden confusion or trouble speaking or understanding others
- Sudden trouble seeing in one or both eyes
- Sudden dizziness, trouble walking, and loss of balance or coordination
- Sudden unusually severe headache with no known cause

Any one or more of these symptoms should prompt a call to “911” right away. Signs and symptoms of a stroke almost always come on suddenly. However, if the symptoms go away after a few minutes, the episode could be considered a transient ischemic attack (TIA). Thrombosis (a clot in an artery), hypotension (a drop in blood pressure), or cardiac arrhythmia (a change in heart rhythm or rate) may reduce blood flow to the brain and could result in a TIA. However, a TIA is considered a warning sign of an impending stroke. Unlike a stroke, a TIA does not cause lasting symptoms. Nevertheless, seeking immediate healthcare and early treatment for a TIA can

help prevent a potential stroke. The signs and symptoms of a TIA usually go away after several minutes. These symptoms are indistinguishable from a stroke.

Clinical Types of Stroke

Based on the immediate pathological cause (ischemia or hemorrhage), severity, duration of clinical manifestations, and the specific healthcare and management required for treatment, there are three interconnected clinical types of stroke that can have similar signs and symptoms:

1. Ischemic Stroke

Ischemic stroke is the most common type especially among older adults. According to the Centers for Disease Control and Prevention (CDC), more than 85% of all strokes in the U.S. are ischemic in nature, in which blood flow to the brain blood supply is blocked by blood clots or fatty deposits and plaque within blood vessel linings as illustrated in figure 1A.

2. Hemorrhagic Stroke

A hemorrhagic stroke occurs when a blood vessel bursts in the brain. In hemorrhagic stroke blood accumulates and compresses the surrounding brain tissue. There are two types of hemorrhagic stroke:

- Intracerebral hemorrhage is the most common type of hemorrhagic stroke. It occurs when an artery in the brain bursts, flooding the surrounding tissue with blood as illustrated in figure 1B.
- Subarachnoid hemorrhage is a bleeding in the area between the brain and the thin tissues that cover it

3. Transient Ischemic Attack

Transient ischemic attack (TIA) is a "warning stroke" or a "mini-stroke" that results in no significant lasting damage. It is the result of a temporary impairment in the brain blood supply. However, recognizing and treating TIAs immediately can reduce the risk of a major stroke.

Stroke Treatment

Stroke treatment involves accessing emergency care, receiving thrombolytic therapy to prevent another stroke, and having subsequent rehabilitation to address physical, functional or cognitive consequences of stroke.

1. Stroke Emergency Care:

For each single minute of delay, an estimated two million brain cells die, and every second that passes diminishes the stroke sufferer's chance to return to normal, productive, and functional life. At its best, stroke emergency care involves:

- Arriving at the hospital as soon as possible after the onset of the first symptoms of ischemic stroke.
- Receiving thrombolytic *tissue Plasminogen Activator* (t-PA) treatment, when indicated, to break up blood clots. The major focus of emergency treatment for an ischemic stroke is to rapidly restore blood flow to the ischemic brain tissue. Research shows that thrombolytic treatment can improve recovery, and is most effective when administered rapidly after the first symptoms of ischemic stroke.
- Medical treatment for hemorrhagic stroke is crucial in order to control blood pressure, brain edema or swelling, and blood clotting. An urgent and prompt surgical intervention may also be needed to stop the bleeding.

2. Preventing Subsequent Strokes:

Stroke and/or TIA patients are at high risk of suffering another stroke. At least one in every eight stroke survivors has another stroke within five years. Effective preventive treatment and control of underlying causes such as heart disease, high blood pressure, atrial fibrillation, high cholesterol, and diabetes is extremely important. Additionally, addressing modifiable risk factors and unhealthy behaviors is essential.

3. Rehabilitation:

The goal of post-stroke rehabilitation is to help regain cognitive, physical, or functional skills that might have been impacted or lost due to the stroke, and/or to make the most of remaining abilities. Rehabilitation often involves physical and occupational therapy that may help relearning practical skills. Stroke patients may need to relearn essential activities of daily living such as how to eat, bathe, or dress. Improving body functions and proper use of medication can help reduce depression or other mental health conditions.

Descriptive Data Analysis

Nevada Aging Population

For more than half a century and until recently, Nevada experienced the most rapid population growth in the nation, especially among older age groups. Between 1990 and 2000 Nevada's population age 65 years and older grew by more than 72%, and continued to increase more rapidly than the rest of the nation until 2006. Currently more than 12% of the state's population is over 65. Such an impressive growth in Nevada's senior population poses a significant challenge for public health infrastructure and the healthcare system with respect to preventing and controlling cardiovascular diseases, especially since advanced age is the single most significant risk factor for stroke.

Data Analysis

The following descriptive analysis summarizes the epidemiological, societal and financial burden of stroke in Nevada. Local data sources include the Nevada Behavioral Risk Factors Surveillance Survey (BRFSS) and the Nevada State Health Division. Additionally, data from the CDC was used to evaluate prevalence, hospitalization, mortality, and healthcare costs related to stroke.

Stroke Prevalence

Discussion

To provide overall stroke prevalence and frequency rate estimates by age group, gender, race/ethnicity, and education level, data from the 2009 Behavioral Risk Factor Surveillance Survey (BRFSS) System was analyzed.

BRFSS is a random-digit dialed telephone survey of the non-institutionalized, civilian population aged 18 years and older in the U.S. The Nevada BRFSS is administered by the Nevada State Health Division in collaboration with the CDC. Stroke prevalence was assessed by age, gender, race/ethnicity, region/location, education, and income level.

In order to allow for more meaningful comparisons between the different demographic groups in Nevada, data was weighted to reflect the population aged 18 years and older, and was age-adjusted to the 2000 U.S. Standard Population. To assess the prevalence of stroke in Nevada BRFSS respondents answered the following question: *"Has a doctor, nurse, or other health professional ever told you that you had a stroke?"*

Table1. Behavioral Risk Factor Surveillance System (BRFSS – 2009)

"Has a doctor, nurse, or other health professional ever told you that you had a stroke?"

National BRFSS Values (Yes-2.4%, No-97.6%)

Demographic	Grouping	N	Yes	No
Nevada	Statewide	3,828	2.42 (1.86- 2.98)	97.58 (97.02-98.14)
Age	18 - 24	95	0.66 (0.00- 1.96)	99.34 (98.04-100.0)
	25 - 34	343	0.07 (0.00- 0.16)	99.93 (99.84-100.0)
	35 - 44	544	0.50 (0.01- 0.99)	99.50 (99.01-99.99)
	45 - 54	716	2.16 (0.82- 3.51)	97.84 (96.49-99.18)
	55 - 64	919	4.66 (2.40- 6.93)	95.34 (93.07-97.60)
	65+	1,211	7.34 (5.36- 9.32)	92.66 (90.68-94.64)
Education	Less than H.S.	231	3.08 (0.90- 5.25)	96.92 (94.75-99.10)
	H.S. or G.E.D.	1,085	2.52 (1.51- 3.52)	97.48 (96.48-98.49)
	Some Post H.S.	1,291	3.61 (2.24- 4.97)	96.39 (95.03-97.76)
	College Graduate	1,209	1.02 (0.56- 1.48)	98.98 (98.52-99.44)
Gender	Male	1,521	2.07 (1.26- 2.88)	97.93 (97.12-98.74)
	Female	2,307	2.78 (2.01- 3.54)	97.22 (96.46-97.99)
Income	< $15,000	306	5.23 (2.65- 7.81)	94.77 (92.19-97.35)
	$15,000 to $24,999	563	3.92 (1.74- 6.09)	96.08 (93.91-98.26)
	$25,000 to $34,999	358	3.07 (0.99- 5.15)	96.93 (94.85-99.01)
	$35,000 to $49,999	517	2.50 (0.81- 4.18)	97.50 (95.82-99.19)
	$50,000 to $74,999	620	1.13 (0.17- 2.09)	98.87 (97.91-99.83)
	$75,000+	999	1.05 (0.30- 1.80)	98.95 (98.20-99.70)
Race	Caucasian	3,098	2.63 (1.94- 3.32)	97.37 (96.68-98.06)
	African American	112	4.70 (0.75- 8.64)	95.30 (91.36-99.25)
	Other Race	269	2.17 (0.56- 3.77)	97.83 (96.23-99.44)
	Hispanic	300	0.77 (0.00- 1.65)	99.23 (98.35-100.0)
Region	Clark County	1,212	2.38 (1.64- 3.13)	97.62 (96.87-98.36)
	Washoe County	1,257	2.58 (1.66- 3.50)	97.42 (96.50-98.34)
	Balance of State	1,359	2.40 (1.68- 3.11)	97.60 (96.89-98.32)

Discussion

According to the BRFSS 2009, 2.42% (95% confidence interval [CI] = 1.86 - 2.98) of the non-institutionalized Nevada adults (3,828 individuals) had a history of stroke as represented in table 1. BRFSS results indicate that in 2009, substantial differences existed in the prevalence of stroke among the various racial/ethnic groups. Significant differences in the prevalence of stroke were also observed relative to education and income levels. Weighted prevalence values are useful tools to estimate actual numbers of individuals with a history of stroke in various demographic groups.

Not surprisingly, the prevalence of stroke increased with age. Compared to 1.23% of persons aged 18 to 44 years, 7.34% of BRFSS respondents aged 65 and older reported having had a history of stroke. This is equivalent to about 20,000 Nevada seniors who are currently living with post stroke complications and probably disabilities.

The prevalence of stroke among women (2.78%) was significantly higher than among men (2.07%). In large part this observation is due to a longer life expectancy for women in Nevada and nationwide.

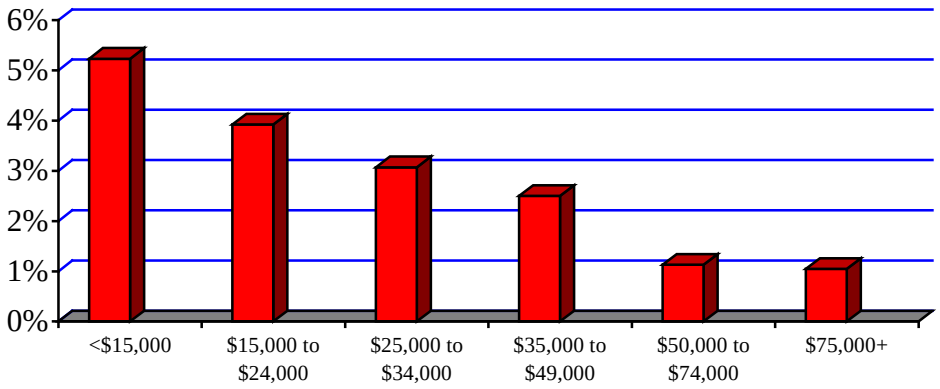
Lower stroke prevalence rates were observed among those with higher education. The prevalence rate for persons with fewer than 12 years of education who reported a history of stroke was 3.08%. This percentage is three times higher than the rate among college graduates, 1.02%.

Significant differences were observed among surveyed racial/ethnic groups. The overall prevalence of stroke was highest among African Americans (4.7%), and only 0.77% of Hispanics and 2.63% of Caucasians who were surveyed reported having had a stroke. These rates are consistent with and comparable to nationally observed figures.

There were no statistically significant differences in the stroke prevalence rates among the different regions of the state. The absolute percent of those who reporting having had a stroke ranged from 2.38% in Clark County to 2.58% in Washoe County.

Similar to the rest of the nation stroke prevalence rates were inversely proportionate to the levels of income as illustrated in figure 2.

Figure 2. Prevelance of Stroke by Income - Nevada BRFSS 2009



The increase in stroke prevalence in Nevada from 2% in 2008, to 2.42% in 2009, was statistically insignificant. Two factors may have contributed to the change in stroke prevalence: stroke incidence and lower death rates due to improved survival rates after cerebrovascular events. Currently, stroke incidence data and long-term survival information is limited; thus, assessing the relative contribution of these two factors is not feasible at this time. An improved surveillance system for stroke, including the active collection of stroke data to determine risk factors, incidence rates, clinical types, disease outcomes, and survival rates would be of paramount value to better understand individual risks, co-morbidities, and underlying causes of illness and death. Additionally, it would help to explain and clarify specific causes of disparities among the different demographic groups.

Data Limitations

It is important to underline that national and state data on stroke is still incomplete, and the findings presented in this report are subject to several limitations including:

- BRFSS data is based on self-reported information, which is subject to recall bias, and frequent misinterpretation of the term "stroke." Differential recall of stroke or ability to report a history of stroke by telephone interview could affect the disease prevalence estimates. However, despite this limitation, self-reported disease history is used routinely to provide stroke prevalence estimates.

- BRFSS does not include persons living in nursing homes, prisons, military bases, or other institutions, populations whose inclusion might alter stroke prevalence estimates for the entire population.

- BRFSS is limited to households with land-line telephones and does not include persons who do not have telephones or those who use cellular telephones exclusively.

- BRFSS response rate was relatively low; however, the prevalence estimates are similar or comparable to other survey estimates (*e.g.*, in-person interviews).

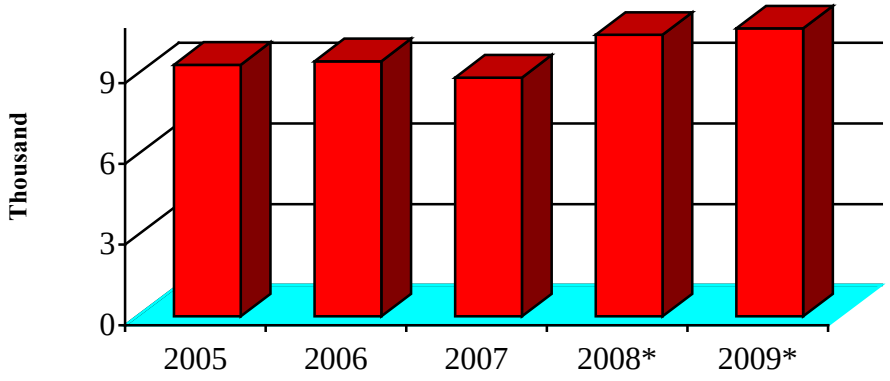
Ongoing focused public education programs and community-based interventions are expected to reduce the prevalence of modifiable risk factors such as obesity and tobacco smoking among susceptible populations, and will subsequently result in decreasing morbidity and mortality associated with stroke in Nevada to meet or exceed the nation's 2020 health objectives.

Stroke Hospitalization

Primary Stroke Centers

Each year about 800,000 individuals experience a new or recurrent stroke in the United States. As illustrated in figure 3, at least ten thousand of them are Nevada residents. Stroke patients in our state sought treatment in about forty-two hospitals and medical facilities around the state. However, only nine hospitals in Nevada are accredited by the Joint Commission as PSCs. The Joint Commission is an independent, not-for-profit organization that accredits and certifies large numbers of healthcare organizations and programs in the United States. PSCs are hospitals that have been certified by the Joint Commission as centers that comply with up-to-date hospital guidelines for the treatment of stroke.

Figure 3. Stroke Hospitalization – Nevada Residents



*Data from 2008 and 2009 is preliminary and subject to change

National studies show that relatively few people with an acute stroke received *tissue Plasminogen Activator* (t-PA), a medication that when given within three hours after the first symptoms of a stroke can help dissolve stroke-causing blood clots. Advances in the treatment of stroke led to the development of PSCs, hospitals where groups of medical professionals who are highly specialized in stroke healthcare, work together to diagnose, treat, and provide early rehabilitation to stroke patients. When compared to general hospitals that treat stroke patients in medical intensive care units or through a mobile in-hospital stroke team, patients treated in PSCs were found to have higher chances for recovery, and have been shown to be more likely to survive, be independent, and live at home one year after their stroke. Several barriers may prevent patients from receiving t-PA; most common being delayed diagnosis inside a busy emergency room or lack of availability specialized medical personnel.

The Brain Attack Coalition (BAC) is a national group working to reduce the number of strokes and associated disabilities in the U.S. Their checklist for hospitals planning to obtain a PSC status and certification of the Joint Commission include the following:

- A CT scan or MRI scanner must be available 24 hours each day, and should be reserved for stroke patients within 25 minutes of being ordered

- Access to neurosurgical services including a brain surgeon
- Laboratory tests of stroke patients must be completed within 45 minutes of being ordered
- A physician with expertise in interpreting CT or MRI studies must be available within 20 minutes of being asked to interpret a study
- A written t-PA protocol must exist in the emergency department
- The medical organization must have a declared and established commitment for acute stroke care
- The hospital must have written acute stroke "clinical pathways" or "care maps"
- An acute stroke team, including a physician and at least one other healthcare professional, must be available around the clock
- The hospital must follow long-term stroke treatment outcomes, and design quality improvement activities
- Emergency staff must have completed formal training in acute stroke treatments
- The hospital must have a "stroke unit"
- The hospital must have a designated stroke center director
- The stroke team must schedule regular stroke medical education sessions
- The hospital must provide formal stroke training for ambulance personnel

The Joint Commission's PSC Certification Program, launched in December 2003, was developed in collaboration with the American Heart Association (AHA) and the American Stroke Association (ASA). Hospitals can become certified through agencies other than the Joint Commission.

A common goal of every PSC is to transport, assess, diagnose, and treat each stroke patient within three hours of the onset of their symptoms. To accomplish this goal, PSC must have written protocols in place in order to ensure that the three-hour goal for treatment is accomplished. Some of the major tasks a PSC should be able to accomplish during this three-hour time “window” include:

- Transporting the patient to the center
- Performing a full evaluation by a physician, preferably a neurologist
- Obtaining and reading a CT scan of the brain
- Drawing blood, analyzing it, and reporting the results
- Delivering appropriate and timely treatment

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Nevada Primary Stroke Centers

As of January 1st, 2011, there were more than 800 certified PSCs distributed in 49 states including nine in Nevada, eight in Clark County, and one in Washoe County.

Below is a list of the Joint Commission-certified PSCs in Nevada in alphabetical order:

1. Desert Springs Hospital
   2075 East Flamingo Road
   Las Vegas, NV 89119
   702-369-7783

2. Renown Regional Medical Center
   1155 Mill Street
   Reno, NV 89502
   775-982-4100

3. Southern Hills Hospital and Medical Center
   9300 West Sunset Road
   Las Vegas, NV 89148
   702-880-2100

4. Spring Valley Hospital Medical Center
   5400 South Rainbow Boulevard
   Las Vegas, NV 89118
   702-853-3000

5. St Rose Dominican Hospitals - Siena Campus
   3001 Saint Rose Parkway
   Henderson, NV 89052
   702-616-5000

6. Sunrise Hospital and Medical Center
   3186 South Maryland Parkway
   Las Vegas, NV 89109
   702-731-8012

7. Sunrise Mountain View Hospital
   3100 North Tenaya Way
   Las Vegas, NV 89128
   702-255-5000

8. University Medical Center of Southern Nevada
   1800 West Charleston Boulevard
   Las Vegas, NV 89102
   702-383-2000

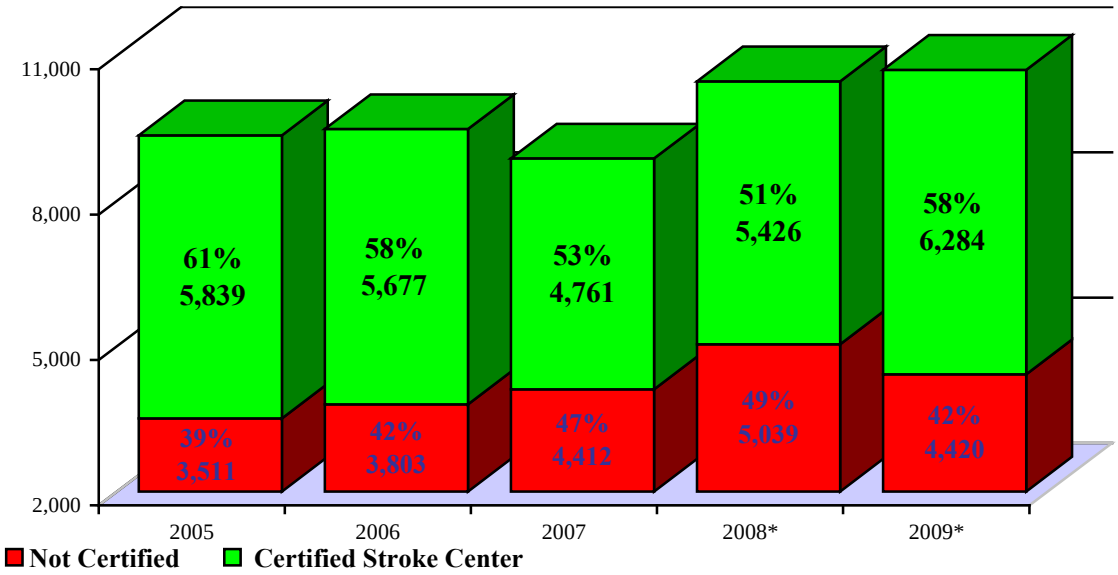
9. Valley Hospital Medical Center
   620 Shadow Lane
   Las Vegas, NV 89106
   702-388-4863

Hospital Discharge Data

Although hospitalization data is very useful to identify and describe morbidity trends by age, location, race/ethnicity, gender, and other demographics, it is important to emphasize that there are some limitations. Not all individuals who develop a stroke are reflected in hospital discharge data. Some are admitted several times and could be counted more than once. Many patients with stroke may not be able to make it in time to a hospital, and death could occur absent admission to a hospital. On the other hand, some stroke patients could be hospitalized with stroke multiple times in multiple hospitals and facilities.

Nevada hospital discharge data suggests that a little more than a half of all acute stroke patients in Nevada received their treatment at a PSC as illustrated in figure 4. While about 61% of stroke cases were treated in 2005 at PSC, this percentage started to gradually decline reaching about 51% in 2008. However, in 2009 the rate of stroke patients who accessed treatment at a PSC in Nevada started to increase again reaching about 58%, probably because more hospitals have since become certified by the Joint Commission as PSCs.

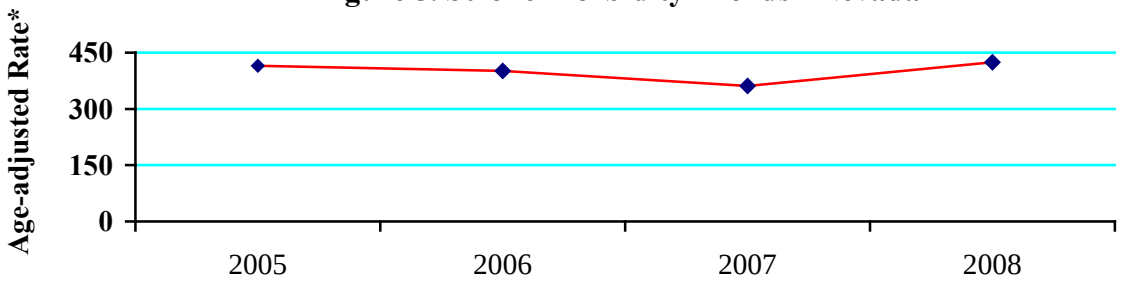
Figure 4. Stroke Patients Treated at PSCs in Nevada



*Data from 2008 and 2009 is preliminary and subject to change

Stroke related age-adjusted hospitalization rate to the U.S. 2000 Standard Population remained relatively unchanged since 2005; ranging from 361.3/100,000 in 2007 to 424.8/100,000 in 2008 as illustrated in figure 5. However, the number of those hospitalized increased slightly each year. This increase was observed among all clinical types of stroke as illustrated in figure 6.

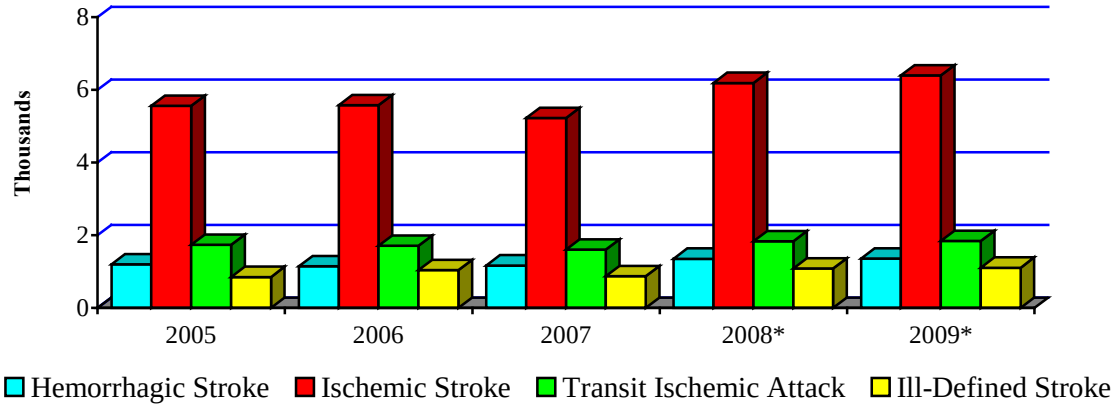
Figure 5. Stroke Morbidity Trends - Nevada



*Rates are age-adjusted to the U.S. 2000 Standard Population

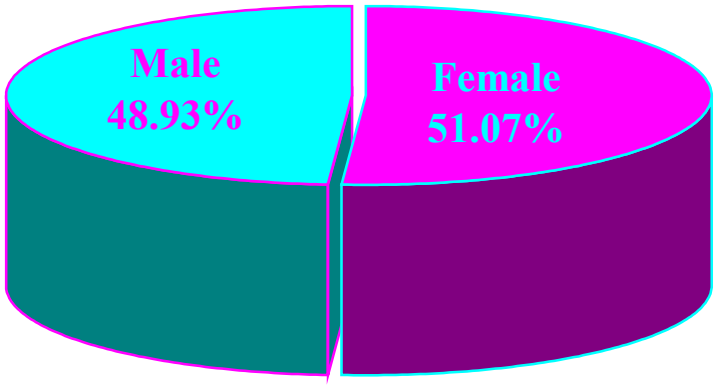
Slightly more than a half (51.7%) of all hospitalized stroke cases in Nevada were females, as illustrated in figure 7. While more men in the younger age groups were hospitalized due to stroke, data showed that the percentage of women in the older age groups (65+) who developed stroke and were hospitalized was significantly higher than that among men. This expected finding is consistent with national observations, as aging is the most significant risk factor for stroke, especially as life expectancy continues to be higher among females in Nevada and nationwide.

Figure 6. Stroke Annual Hospitalization by Type - Nevada



*Data from 2008 and 2009 is preliminary and subject to change

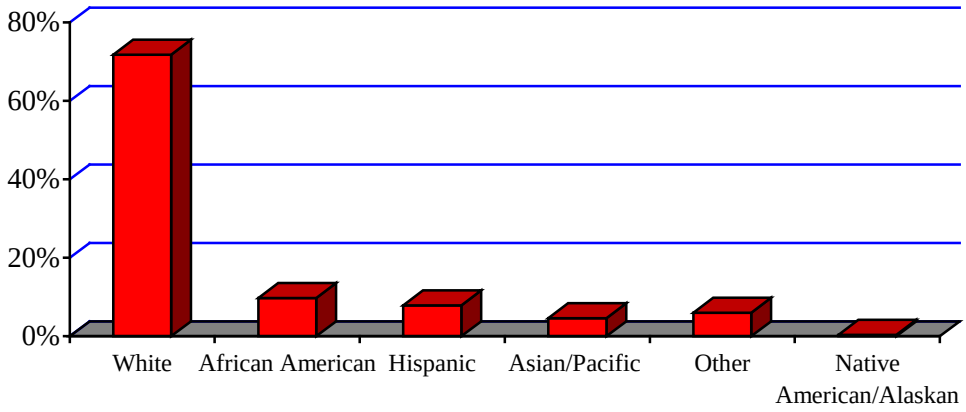
Figure 7. Stroke Hospitalization by Gender Nevada 2009*



*Data from 2009 is preliminary and subject to change

About 9.79% of all hospitalized stroke cases were among African Americans. This percentage is significantly high when compared to the 6.9% general percentage of African Americans among Nevada populations. Higher rates of stroke risk factors such as hypertension and diabetes are generally observed among individuals of African American origins in Nevada and the U.S. About 7.9% of those hospitalized due to stroke in Nevada were Hispanics, and about 4.6% were Asian/Pacific Islanders as illustrated in figure 8.

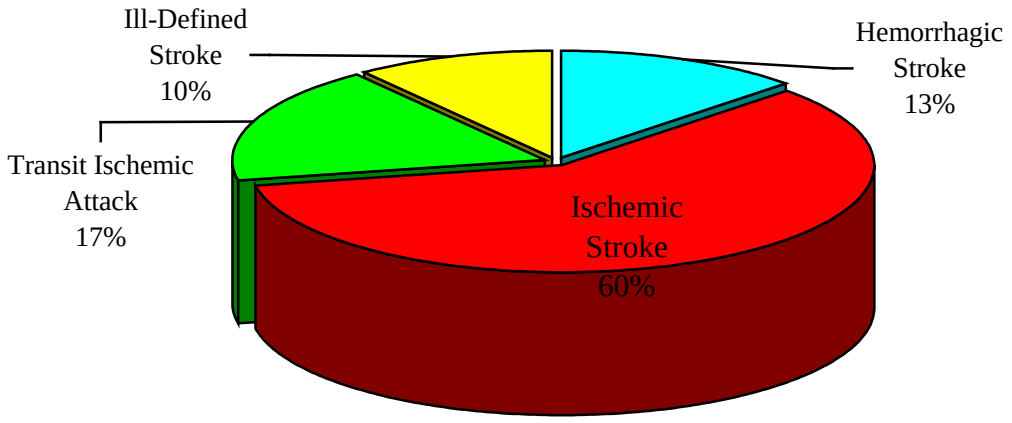
Figure 8. Stroke Hospitalization by Race/Ethnicity Nevada 2009*



*Data from 2009 is preliminary and subject to change

More than 59.2% of those hospitalized for stroke in Nevada between 2005 and 2009 suffered an ischemic stroke, about 12.8% suffered hemorrhagic stroke, 10.2% were identified as having an ill-defined stroke (i.e., medical record did not specify ischemic or hemorrhagic stroke), and 17.9% had transient ischemic attack or TIA, as illustrated in figure 9. These findings were consistent, similar, or comparable to nationally observed rates.

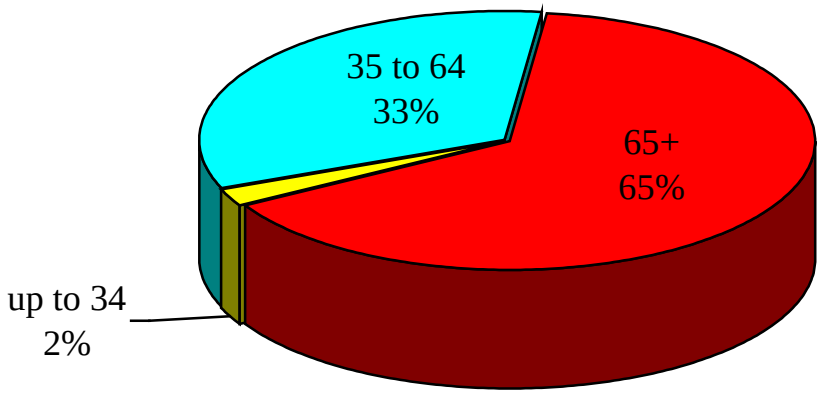
Figure 9. Stroke Hospitalization by Clinical Diagnosis Nevada 2009*



*Data from 2008 and 2009 is preliminary and subject to change

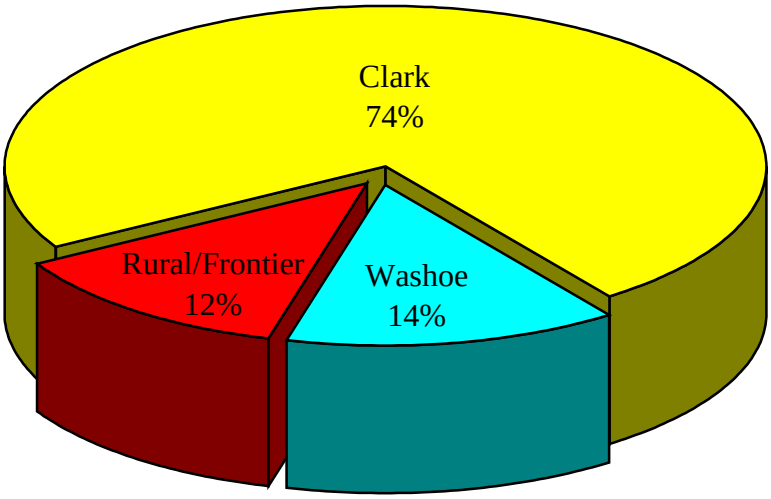
Reflecting nationally observed rates, about one third of those hospitalized in Nevada due to stroke-related events were younger than 65 years of age, and more than 65% were age 65 and older as illustrated in figure 10.

Figure 10. Stroke Hospitalization by Age Group Nevada 2009*



*Data from 2009 is preliminary and subject to change

Figure 11. Stroke Hospitalization By Region - Nevada 2009*



*Data from 2009 is preliminary and subject to change

Most of the hospitalization and medical care for stroke cases occurred in Clark County hospitals. However, only eight hospitals in Clark County and one facility in Washoe County are currently certified as PSCs.

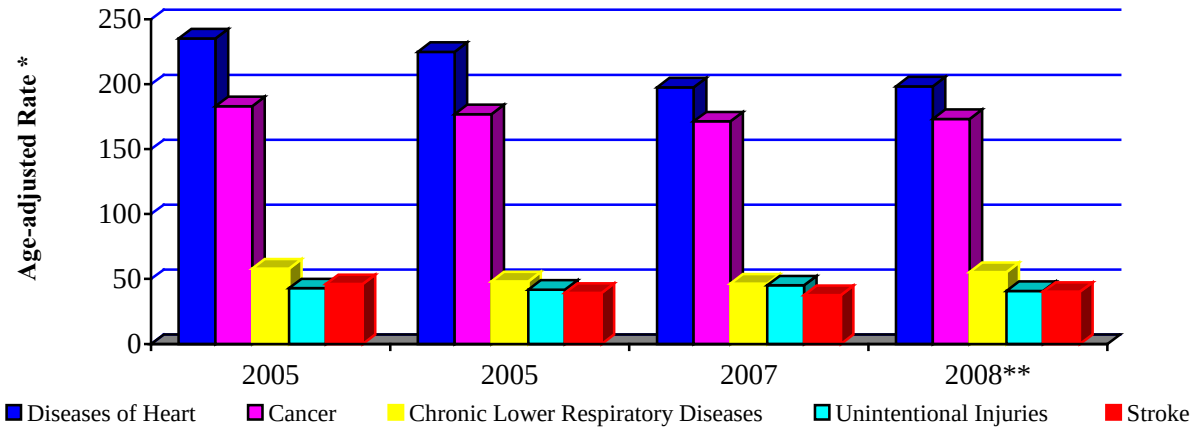
As illustrated in figure 11, about 74% of those hospitalized for stroke were residents of Clark County, 14% resided in Washoe, and about 12% were residents of Nevada's fifteen rural and frontier counties. Demographics for those hospitalized with stroke are comparable to Nevada's population distribution.

Stroke Mortality

Each year, approximately 800,000 persons in the United States experience a stroke. About 614,000 of them experience this serious neurologic event for the first time, and the remaining are recurrent cases with a history of one or more strokes or a TIAs.

Stroke is the third most common cause of death in the United States and the fifth leading cause of death in Nevada as illustrated in figure 12. Compared to other regions, stroke death rates are highest in the southeastern region of the U.S. African Americans, American Indians/Alaska Natives (AI/ANs), Asians/Pacific Islanders, and Hispanics develop stroke and die from it at younger ages than Caucasians.

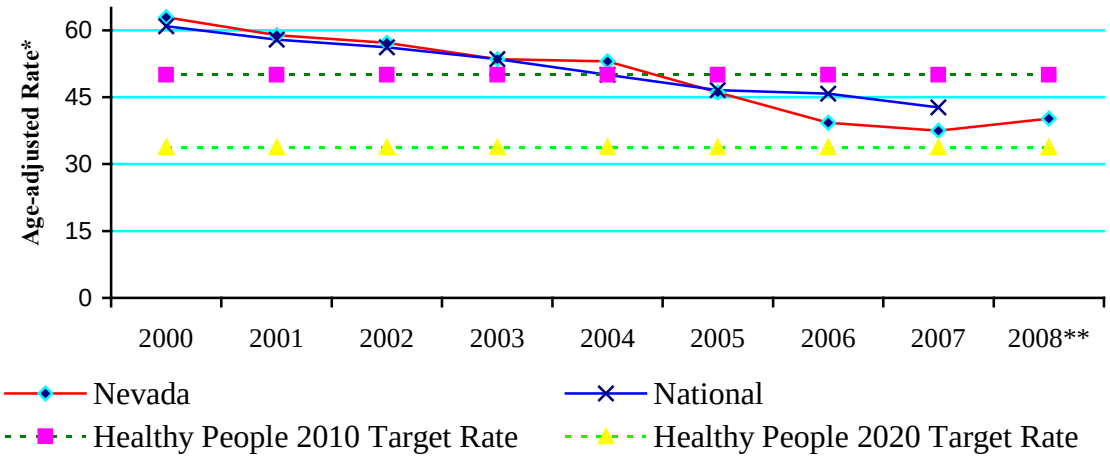
Figure 12. Leading Causes of Death in Nevada



*Rates are age-adjusted to the U.S. 2000 Standard Population
**Data from 2008 is preliminary and subject to change

Due to modern therapy, team approach, and prompt healthcare management, stroke mortality showed a clear tendency to decline over the past few years. As illustrated in figure 13, the 2010 Healthy People National Target Rate for stroke mortality was set to 50/100,000, and the 2020 Healthy People National Target Rate was further reduced to 33.8/100.000 or less.

Figure 13. Stroke Mortality Trends - Nevada

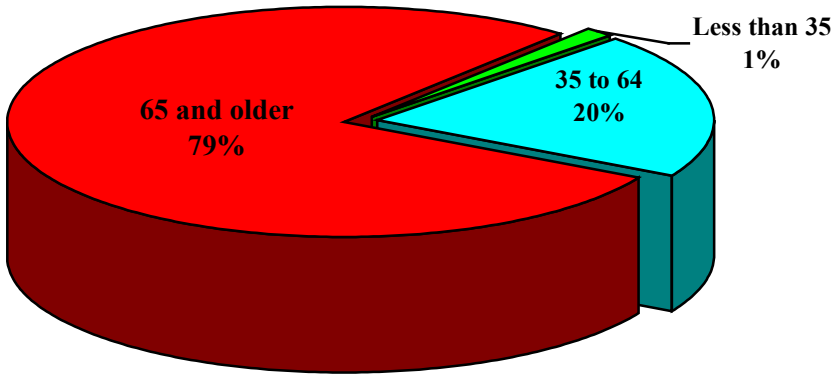


*Rates are age-adjusted to the U.S. 2000 Standard Population
**Data from 2008 is preliminary and subject to change

As illustrated in figure 13, in 2005 Nevada met and exceeded the Healthy People 2010 Target Mortality Rate. Since then, Nevada's age-adjusted mortality rate due to stroke has continued to decline. The most recent observed rate of stroke-related death in 2008 in Nevada was 40.2/100,000 U.S. Standard Population.

Age is the most significant risk factor for developing a stroke and dying from it. Almost all mortality in Nevada due to stroke occurred among individuals older than 35 years of age. One fifth occurred among those ages 35 to 64, while about 80% of all stroke deaths occurred among persons aged 65 and older as illustrated in figure 14.

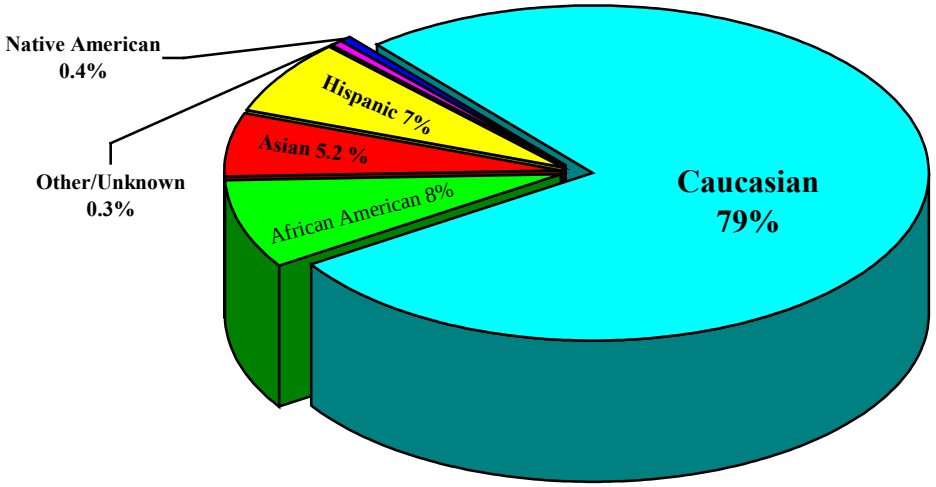
Figure 14. Stroke Mortality by Age Groups - Nevada 2009*



*Data from 2009 is preliminary and subject to change

About 80% of deaths related to stroke in Nevada occur among Caucasians, and 7% among individuals of Hispanic origin. Although African Americans represent about 6.9% of the state's population, more than 8% of stroke related deaths in Nevada were among African Americans as illustrated in figure 15.

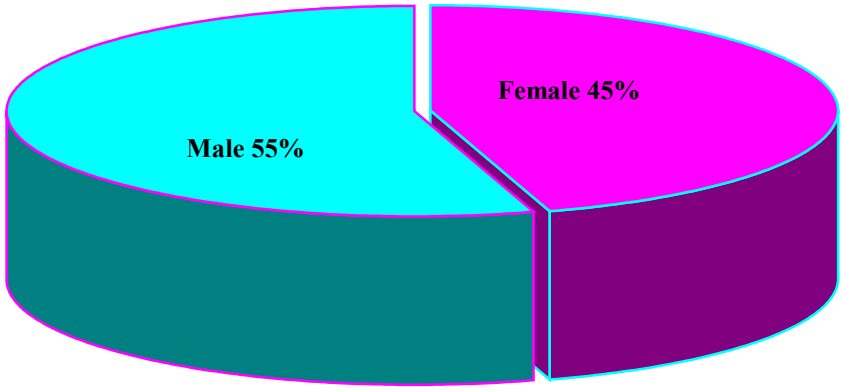
Figure 15. Stroke Mortality by Race/Ethnicity - Nevada 2009*



*Data from 2009 is preliminary and subject to change

Although more females than males develop stroke at older age as illustrated in figure 7, men exhibit a higher risk of developing a stroke and dying from it at younger age as illustrated in figure 16.

Figure 16. Stroke Mortality by Gender - Nevada 2009*

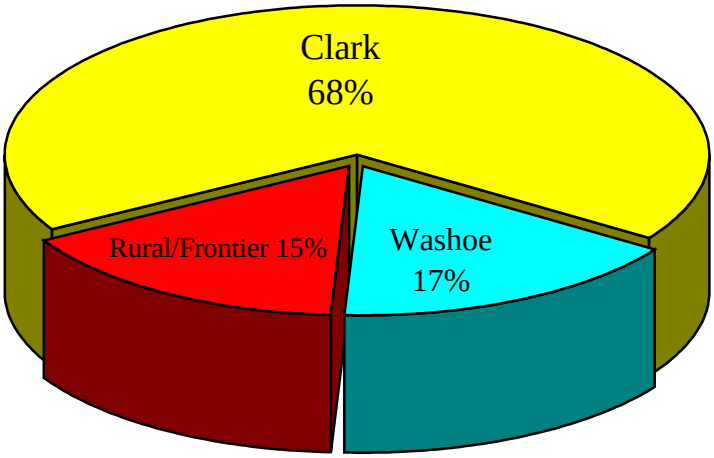


*Data from 2009 is preliminary and subject to change

About 68% of all stroke deaths in Nevada between 2005 and 2009 occurred among residents of Clark County, 17% among Washoe County residents, and about 15% occurred among residents of Nevada's fifteen frontier and rural counties as illustrated in figure 17. These figures correspond to the hospitalization rates and are comparable to the general distribution of Nevada

residents. Such finding shows that the risk of developing a stroke and dying from it in Nevada was not affected by the place of residence in the state.

Figure 17. Stroke-related Death by Region - Nevada 2009*



*Data from 2009 is preliminary and subject to change

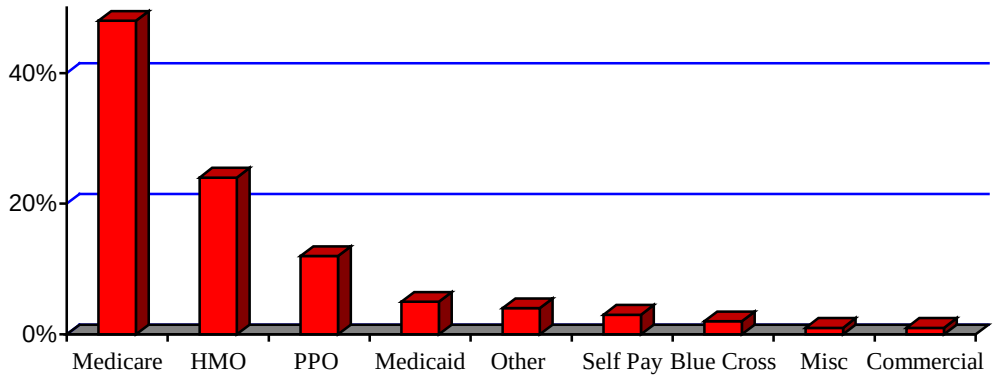
National literature shows that the likelihood of developing a stroke and dying from it is correlated with age, behavior/lifestyle, quality of care, and the availability of a nearby PSC. In order to reduce morbidity, mortality, and disability from stroke, and to improve the quality of life for stroke survivors and their families, the Nevada State Health Division is developing a system to educate seniors about stroke risk factors, quick recognition of stroke symptoms, and the importance of rapidly calling “911.”

Economic Factors of Stroke

Stroke is a devastating, prevalent, deadly, and costly older age disease. In addition to its tremendous negative impact on our society, stroke treatment adds a significant financial burden to healthcare costs in our state and nationwide. Nevertheless, stroke and most of its complications can be prevented.

According to the CDC, national costs related to stroke treatment and care exceeded $62.7 billion in 2007 and reached about $73.7 billion in 2010. The mean lifetime cost resulting from an ischemic stroke is estimated to be more than $140,000 per patient. About 90% of stroke hospitalization cost in Nevada during the four-year period between 2005 and 2009 was covered by four major pay sources as illustrated in figure 18. Medicare supported about 50% of the stroke-related healthcare expenditure; healthcare management organizations (HMO) covered about 24%; preferred provider organizations (PPO) negotiated rate paid about 12%, and Nevada Medicaid covered about 5% of the stoke healthcare costs.

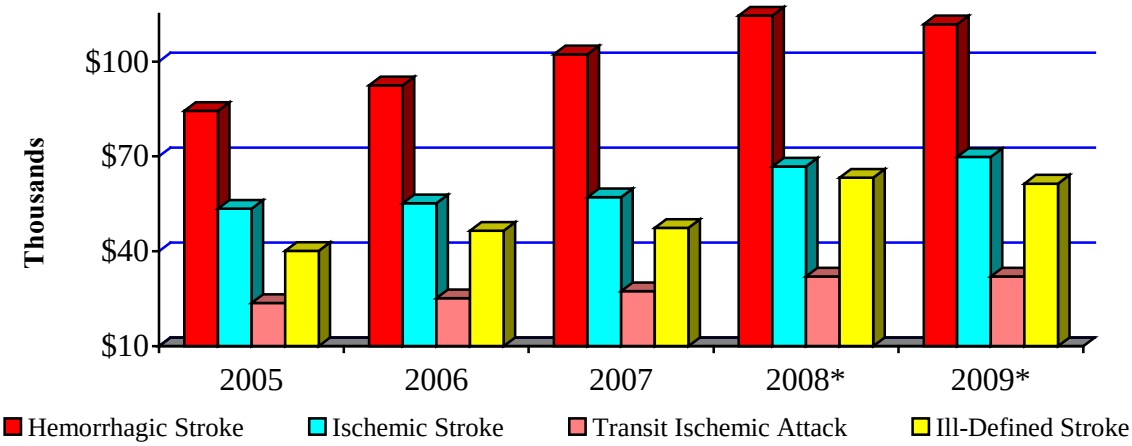
Figure 18. Stroke Hospitalizations by Payer Nevada 2009



*Data from 2009 is preliminary and subject to change

Between 2005 and 2009, healthcare expenditure due to stroke in Nevada continued to increase for every stroke type exceeding $725,238,000 in 2009. The mean cost was $111,813 per each case of hemorrhagic stroke, $31,000 for a TIA, and $54,000 for an ill-defined case of stroke. Furthermore, healthcare costs for an ischemic case of stroke exceeded $70,000 in 2009 as illustrated in figure 19.

Figure 19. Mean Hospitalization Cost - Nevada



*Data from 2008 and 2009 is preliminary and subject to change

Summary

Stroke is preventable. The list below illustrates relevant CDC national and state-specific facts and figures about the scope of stroke within the United States.

- Stroke is the third leading cause of death in the country and fifth in Nevada
- Someone in the United States has a stroke every 40 seconds
- Every three to four minutes, someone dies of stroke
- Stroke is a leading cause of death for both men and women
- Every year, about 800,000 Americans have a stroke. About 614,000 of these are new cases of stroke and about 186,000 are survivors of a previous stroke or a TIA
- Stroke is an important cause of disability in America. In 2005, nearly 1.1 million stroke survivors reported difficulty performing basic activities of daily living
- In 2010, stroke costs in the U.S. exceeded $73.7 billion. This total includes the cost of health care services, medications, and lost productivity
- Several un-modifiable risk factors, such as heredity, age, gender, and ethnicity are significant determinants of the disease
- Some medical conditions, including high blood pressure, high cholesterol, heart disease, diabetes, overweight or obesity, and history of a previous stroke or a TIA can increase the individual risk for developing a stroke
- Not smoking, refraining from excessive drinking, healthy diet, and living healthy and active are choices that can reduce the individual risk for stroke

While aging is the single most significant risk factor for the cardiovascular disease, stroke should not be considered an inevitable consequence of aging. Individual risk factors for stroke can be reduced significantly by making healthy choices and managing underlying medical conditions. Healthy living and none risky behaviors and lifestyles may include implementing the following:

- Eating a healthy diet
- Maintaining a healthy weight
- Being physically active
- Not using tobacco products
- Limiting alcohol use
- Controlling blood pressure
- Controlling blood cholesterol
- Taking a daily aspirin (after consulting a healthcare provider)
- Managing diabetes

The value of identifying and controlling risk factors (*e.g.*, high blood pressure, heart disease, atrial fibrillation, high blood cholesterol levels, diabetes, tobacco use, alcohol use, physical inactivity, and obesity) for reducing the risk for stroke is well-established. Policies that reduce tobacco exposure and promote healthy living (*e.g.*, access to healthy foods, school and

workplace health education, and environments that are safe for and conducive to physical activity) can contribute to the prevention of stroke and other cardiovascular diseases.

Finally, measures that improve recognition and rapid identification of early signs of stroke and timely access to a PSC can minimize the impact on individuals and reduce the heavy burden of this disease on the family and community as a whole. This detailed descriptive analysis of prevalence, hospitalization, mortality, and costs associated with stroke in Nevada is aimed to assist health planners, policy makers, and public health officials to focus prevention resources efforts and target high-risk individuals and groups.

Integrated System for Stroke Prevention

The Nevada Comprehensive Profile on Stroke Prevention is intended for use by public health professionals, policy makers, health planners, healthcare providers, the public and media. It includes a detailed section on stroke risk factors and ways to prevent this disease, physiopathology, common signs and symptoms, and treatment for the different types of stroke. Additionally, it includes a thorough data analysis describing the extent of this disease (prevalence, incidence, hospitalization, and mortality trends), and a brief description of the societal, medical, and financial impact of stroke in Nevada and nationally.

Nevada Comprehensive Profile on Stroke Prevention includes a statewide population-based plan to create, promote, and coordinate prevention, early detection, and case management of stroke in Nevada. This Integrated System of Stroke Prevention (ISSP) addresses community development, mobilization, and partnerships with healthcare providers, community-based organizations, and state stakeholders to increase awareness regarding early identification, rapid transportation and proper management. It also promotes the coordination of a system in which Nevada residents and visitors who experience a stroke can have rapid access to appropriate and timely coordinated healthcare plan (CHP) at a PSC where they have a maximum potential to achieve most favorable outcomes.

The implementation of the Nevada Comprehensive Profile on Stroke Prevention will significantly benefit stroke patients by promoting instantaneous access to appropriate and timely diagnosis and treatment. Patients will benefit from the availability of state-of-the-art healthcare at specialized PSCs, and Nevada will effectively reduce morbidity, mortality, and costs. Additionally, the quality of life for all stroke patients and their families will significantly improve, and the state of Nevada will be able to meet and exceed the Healthy People 2020 National Target Rates.

Components of the Nevada ISSP

- Public education to increase the general awareness for rapid recognition of stroke signs and symptoms
- Quick response at home, by the ambulance, and in the emergency room or PSC
- Provider education, regular updates, and assessment tools on best practices to identify and case manage stroke patients
- Screening for and management of cardiovascular disease (CVD) risk factors such as hypertension, obesity, diabetes, and high cholesterol in primary care settings
- Development and implementation of standardized stroke protocols, assessment tools, stroke education programs for the public, EMS providers and first responders

Under the most ideal circumstances, every person experiencing a stroke should be entitled to a CHP, which should include:

- Proper care and rapid transportation by EMS to PSCs
- Hospital stroke teams with specific training at specialized PSCs

- Standard protocols for rapid diagnosis and treatment, and subsequent rehabilitation to ensure favorable outcomes. Such activity requires active participation and involvement of several healthcare partners and a multidisciplinary team (MDT) of clinicians and public health professionals including experts from the following organizations:

    - Nevada State Health Division
    - Local health authorities
    - EMS
    - Medical schools
    - Centers for Medicare and Medicaid (CMS)
    - Healthcare providers
    - Community clinics, hospitals, and PSCs
    - State, county, and local community stakeholders
    - Healthcare Management Organizations (HMOs) and insurance groups
    - Nevada Hospital Association
    - Drug manufacturers
    - Home health care agencies
    - Health advocacy groups
    - Non-profit organizations such as the American Stroke Association

Responsibilities of the MDT

The Nevada MDT will review and evaluate current practices and policies for stroke care and will identify gaps in service. It will establish policies, provide recommendations, and suggest solutions that are consistent with national guidelines. MDT experts will focus on identifying interventions and strategies to:

- Develop and disseminate appropriate and culturally sensitive public education and prevention programs that will focus on:
    - Promoting healthy lifestyle for all Nevada residents especially those with significant modifiable risk factors
    - Promoting policy, environmental, and systems changes in communities and workplaces to promote physical activity and healthy nutrition
    - Reducing the incidence, complications, prevalence, mortality, disability and cost of stroke
    - Supporting healthy lifestyles (*e.g.,* healthy food options and worksite wellness programs).
- Enhance screening practices and control for CVD risk factors such as diabetes, hypertension, obesity, and cholesterol in primary care settings
- Distribute standardized stroke assessment tools and provide training opportunities and educational program for the EMS providers. MDT members will partner with EMS to develop a system that focuses on:

    - Facilitating faster EMS response times

- Enhancing pre-hospital recognition, management, and rapid transportation to an appropriate health care facility
- Developing a stroke assessment tool based upon best practices for EMS responders
- Ensuring the ongoing training for all EMS responders in stroke assessment, transportation, treatment and care
- Developing and updating stroke care protocols with core elements to ensure:
    - ✓ Immediate assessment
    - ✓ Rapid transportation
    - ✓ Communication among hospitals and EMS responders that allows for regional differences

- Evaluate hospitals to ensure that standardized care protocols are consistently implemented from the acute phase through discharge planning, including referrals and rehabilitation
- Provide post-stroke educational materials for survivors and their extended family and community support

The Bureau of Healthcare Quality Control at the Nevada State Health Division will support:

- Providing hospitals and EMS with up-to-date information on the location of PSCs, available services, and bed capacity
- Increasing the number of hospitals that achieve PSC status
- Developing standardized stroke care protocols that are consistently implemented during an acute care stay
- Providing stroke education that meets the Joint Commission on Accreditation of Healthcare Organizations (JCAHO) Stroke Education Requirements for all stroke care professionals
- Establishing discharge protocols that include referral criteria for follow-up care, and a reciprocal relationship among stroke care providers and the patient's primary care physician.
- Developing a post-stroke recovery plan in which patients, acute care and rehabilitation team/facility (*e.g.,* skilled nursing facilities, home health agencies), primary care physicians, community agencies, and the patient's family and social network can be actively involved. The plan would ensure that:
    - Stroke survivors receive individualized assessment and referral to appropriate rehabilitation in order to achieve optimal post-stroke outcomes
    - Preventable complications are addressed
    - Stroke survivors and their care givers receive appropriate post-stroke education according to established protocols, and written information on stroke risk factors, warning signs, and the importance of timely use of EMS services.

Currently, several states are successfully implementing similar stroke prevention plans. Through the proper adherence to standard principles for stroke healthcare and the implementation of the ISSP, Nevada can reduce morbidity, mortality, disability and complications associated with stroke, and can improve the quality of life for stroke patients, their families and community.